PILOT REPORT SUMMARY

Since the beginning of the project, the pilots have been debriefed after every flight in accordance with format enclosure number 2. Reports cover comments of the pilots, personal equipment, and medical/psychological aspects of the flight.

25X1A This summary is an analysis utilizing approximately 80% of the reports from 11 November 1955 to 21 March 1958 on flights at [redacted] Edwards, and the Detachments. Unfortunately, all reports were not available. Missing is a group from one detachment covering periods from February 1956 through November 1956, and from 1 January 1957 through March 1958.

* * * *

I. Flying hours reviewed totaled 9,493:05.

II. Flameouts: Intentional numbered 44 and unintentional 144.

A. In the absence of destroyed reports, it is estimated that there were a total of 90 intentional and 200 unintentional flameouts.

B. The -37 and -31 models of the P & W J-57 engine have been modified to operate at very high altitudes. Sacrifices were made to accomplish this. Acceleration characteristics are very poor below 60% RPM. Throttle setting is critical at altitude. Adverse yaw or uncoordinated maneuvers can cause a flameout. The -37 engine was the first engine model used. It leaked oil, flamed out readily, weighed more, and had less thrust than the -31.

C. The most critical operating factor of the engine at altitude is the pressure ratio between the engine inlet and the turbine discharge. Too low a P.R., which was normally the case, caused the engine to operate out of its enveloping limits and "air starved" the system. That is, the engine flamed out due to too rich a fuel mixture. The -31 operates in a larger P.R. envelope and has proven less susceptible to flameout than the -37 model.

D. The engine operates well to 66,000 feet and is fairly reliable to 70,000 feet. However, the latter range is where the majority of flameouts have occurred. Maximum altitude attained by the aircraft has 25X1D been reported as [redacted] feet true altitude.

E. There have been three reported cases of engines failing to relight subsequent to flameout. These have been caused by fouled plugs or burned ignition coils. Some engines have had a history of repeated flameouts. As with all engines, quality control is very critical. However, failure to relight is the exception and not the rule.

F. The fuel boost pump is needed above 55,000 feet. It is operated hydraulically. Two cases of reported pressure loss at altitude have caused flameout.

G. Three incidents of engine power remaining in idle or not responding to throttle movement have been reported. These occurred during descent. The cause was traced to a fuel control bleed line separating and restricting the fuel control to idle power. The pilots were in an advantageous position at the time, and landed without further incident.

H. Due to the engine's excellent relight characteristics, the problems of flameout have reached the point of being routine. The engine manufacturer is constantly working to improve engine performance; both in altitude capability and reliability. The problems remain a challenge.

III. Accidents - 22 accidents recorded of which 9 were major (4 fatal, 4 landing, 1 bailout) and 13 minor (7 landing, 5 ground, 1 airborne).

A. Major - Fatal.

1. After take-off, pilot attempted to jettison hung pogo, made a low turn, stalled, crashed, and burned. This fatal accident took place 4 miles from the airfield. The pilot had little time in the aircraft and it was assumed that he did not monitor airspeed closely enough.

2. On a night take-off, aircraft veered to the left, crashed and burned close to the runway. Pilot had little time in the aircraft. This was his initial night check-out. It was assumed that the pilot experienced vertigo upon leaving the ground, pulled up too steeply, and stalled.

3. Ten minutes after take-off, climbing to 35,000, aircraft came apart. No definite conclusions were reached. It is suspected that the pilot exceeded the air speed limits, or that he flew into severely turbulent jet-wash from aircraft that were in the vicinity. No attempt at bailout was made.

4. Peculiar circumstances surround this fatality on a routine test flight. Pilot got to flight altitude with no reported trouble. Wreckage was located three days later with pilot close by. No definite

conclusions could be drawn. It was suspected by the airframe manufacturer that an oxygen malfunction may have caused the initial problem. Pilot flew, or aircraft descended, to lower altitude, where he regained enough of his senses to leave the aircraft. Pilot was too low or lost consciousness and did not activate chute. Investigation revealed possible malfunction of the heavily crash-damaged faceplate latch and exhalation valve. The oxygen regulator was salvaged and checked out normally.

B. Major - Landing.

1. Two accidents caused by pilots flaring out too high, and shearing gear on contact with ground.

2. One report of pilot landing too short and shearing gear on edge of runway.

3. One report of engine failing to respond on GCA final and aircraft landing one-half mile short of runway.

C. Minor - Landing.

1. Seven accidents reported. Hard landings caused permanent wrinkles in tail sections. Flaps damaged on landing roll. Main tires blew damaging fairing doors.

D. Minor - Ground.

1. Five accidents reported. Improper towing by ground crew bent tail gear mounts. Fuselage skin damage due to improper removal of wing dollies. Ailerons damaged by taxiing over obstacles.

E. Minor - Airborne.

1. Hatch cover blew off in flight and damaged wing and tail sections. Pilot landed aircraft without further incident. The locking mechanism was not secured properly allowing the slipstream to pull the hatch away.

IV. Bailouts

A. One unsuccessful. Pilot left aircraft but did not activate chute. It was assumed he was either too low, or lost consciousness, and could not complete the procedures.

B. One successful. Pilot became hypoxic. At approximately 28,000 feet airplane came apart. He left or was pulled out of aircraft

by windblast. Aircraft disintegrated due to abnormal air loads greater than design limits. Chute deployed and pilot landed without further incident.

V. Aborts.

A. 10 recorded (15 estimated total).

VI. Incidents.

A. Incident reports were not recorded until late in the program. Those reported are included in later paragraphs.

VII. Personal Equipment.

A. Hard hat. Early in the program, frequent improper fits were attributed to poor quality control. Mounting clips also stuck. Remedied, no problems at present. White helmet proved superior to olive drab color for reflecting solar heat.

B. Wire harness. No problems at first. Pilots failure to pull strap down snugly allowed helmet to rise uncomfortably. A wooden locator knob attached to the pull-down strap eased locating strap during hurried conditions. Some strap slippages were reported during helmet inflation. Redesign of this assembly has eliminated problems in this area.

C. Helmet. Early difficulties in fit can be attributed to newness of equipment to both pilots and P.E. personnel. Care and experience have alleviated this.

1. Early neck-seal blow due to leaks and natural rubber bladder deterioration have been remedied by redesign and incorporation of a neoprene rubber bladder to replace latex.

2. A test block has been devised which allows P.E. personnel to check faceplate, bladder, and helmet components under full pressure conditions prior to each flight. This practice has enabled detection of leakage and deterioration cases before they become serious.

3. Through use, the present neck seal has a tendency to roll over on itself and cause discomfort, blisters and rash on the neck. Lubricant and talcum powder are an aid. If the rolling cannot be corrected, a change of bladder is in order.

4. Most common points of leakage are cracks in bladder at faceplate seal, improperly fitting faceplate, and poor quality control.

5. A few cases of heat rash have been reported. These have been alleviated by routine washing of helmet components and treating pilot with medicines.

6. Conclusion: Helmet lacks comfort. Must be adjusted from time to time to alleviate pressure points. Given proper care and attention, it is very reliable.

D. Faceplate.

1. Fogging and condensation occurred frequently in early flights. The main cause of trouble was in seatpack and faceplate wiring, which failed at the rheostat. Various improvements have evolved and finally in the latter part of the program, an adequate system was devised. The faceplate is heated normally through manually adjustable rheostat, and in emergency directly from the battery, providing emergency faceplate heat with a dead engine or generator failure.

2. The present hookup does have minor drawbacks. To utilize emergency heat, a circuit breaker is pushed in and normal system disconnected. The present electrical connections on the faceplate are snap-on and can become dislodged, wet, and subject to electrical shorting.

3. Another type of faceplate fogging occurred during ground operations. Early morning or late evening condensation, similar to the type common on automobile windshields, was common and dangerous. It usually occurred while hooking up the pilot in the aircraft. Wiping the faceplate with a defogging solution and utilizing an auxiliary faceplate as much as possible kept this to a minimum.

4. An early problem of the pilot being unable to re-hook and reset the faceplate has been solved by redesigning the bottom latch with a locking device, and briefing pilots to utilize the side mirrors whenever the faceplate is being reset. Also it has been found that each faceplate must be hand-fitted to the helmet to assure ease of operation. It has been concluded that the faceplate should not be open during flight except for emergency conditions.

5. Red-tinted faceplates have been tried for night flying to aid night vision. These have proved somewhat impractical in practice as floodlights and flashlights are used by the ground crew and any night vision advantage was easily lost.

6. Green-tinted faceplates have been tried. Pilots' reactions are varied. Most agree that it is a welcome improvement above cloud layers to combat glare, but a detriment below cloud layers as it curtails some vision, particularly in the cockpit.

7. A green-tinted piece of thin plastic which slips over the faceplate, catching under the metal faceplate ring and removable at any time by the pilot, seems to be the answer. This is still being worked on.

8. Exhalation valve.

a. The exhalation valve is located on the faceplate. Early valves had a latex rubber diaphragm which deteriorated, causing a very serious problem. The slightest valve leakage allowed the valve to fail in a full open position, providing no, or very little, helmet pressure in time of emergency. Four cases of this malfunction caused degrees of hypoxia with accompanying loss of pilot's efficiency. It is suspected that this was a contributing cause in one fatality.

b. Late in the program, all valves were replaced with ones having silicone rubber diaphragms. The diaphragms alone cannot be field replaced. Complete assembly replacement has alleviated the problem thus far. No cases of diaphragm rupture have been reported since employment of the silicone.

c. Several cases of sticky exhalation valve have been reported. The two main causes for this are as follows: The tolerances in the valve are so critical that any small dust particle or foreign matter causes sticking; any bending of the case or improper seating in the faceplate causes binding. The dust problem can be held to a minimum by keeping the mission faceplate in its protective bag as much as possible.

d. The problem of the bent valve case arose when replacement was done in the field. The small pressure balancing tube between the inhalation and exhalation valves had to be bent to allow the valves to seat flat against the faceplate. If this tube was not set to the precise angle, pressure was exerted on the case--consequently the bind. This item has recently been U.R.'d and the manufacturer requested to supply the valve with tubing pre-bent. Replacement can then be accomplished safely in the field.

9. Many pilots reported hunger, particularly dryness and thirst, on long flights. Late in the program a 3/8" orifice was placed in the front of the faceplate with an airtight movable cover. This provided a means of receiving in-flight fluid and food without removing the faceplate. To date it has proved impractical and a source of leakage. No safe solution to this problem has been found.

10. Conclusion: The faceplate has many parts. It is cluttered. Too many things can go wrong. It requires a lot of attention.

The exhalation valve is a potential hazard in that it fails in the open position. It could be redesigned, but to date is the best available valve on the market.

The faceplate, with constant attention, does the job it was designed to do.

E. Pressure Suit.

1. The main problem with the suit has been and always will be the fit. The early suits had a tight-laced neck which exerted undue pressure on the adam's apple. There was no additional chest protection, and the pilot was bent forward at the neck so that while standing, he was forced to assume an ape-like posture. In fact, one of the pilots has an ape-like posture, and to this day looks like a green-suited, baldheaded ape.

2. The presently used suit evolved from this early model. The neck was modified and a chest bladder incorporated, which greatly improved the protection, and wedges of cloth added for more comfort and better fit. Zipper arrangement was also improved. Pilots who heretofore could only sustain 30 minutes inflated at altitude in the pressure chamber could now endure 2+ hours--and also walk around.

3. On this suit, lacing was tightened or loosened to conform with the man's physical shape, rather than the suit's cut. Marks on the pilot's body were attributed to too loose-fitting underwear and tightness in the armpits later was relieved by wearing underwear inside out so that seams wouldn't bind. Parts of zippers were removed where not needed to improve comfort.

4. Four cases of broken zippers have been reported. These have been repaired with no trouble.

5. Washing has been kept to a minimum, the main reason being that the suit shrinks slightly on drying, resulting in numerous complaints of tight fit. Suits were normally washed every 5 flights or whenever necessary. Hand washing is done with soap in lukewarm water and hung up or stretched out to dry. A fresh clean set of underwear was used every time the suit was donned.

6. On a long mission (8 hours) it was not uncommon for a pilot to lose 5 pounds. This weight loss was attributed solely to perspiration.

7. Some deterioration under the armpits has occurred caused by perspiration. This has been repaired in the field.

8. A few cases of capstans failing to deflate after let-down have been reported. These are attributed to sticky regulator dump valves. This is uncomfortable, but not dangerous. Manipulation of the wrist dump valves has usually released pressure.

9. The longest duration on report of a suit being inflated at maximum altitude under actual flight conditions is one hour. Pilot reported great difficulty in reaching various switches. No other discrepancies were encountered.

10. The two outer garments, one light for warm climate, one thick, padded for cold, have proved satisfactory. White patches were tried for reflecting purposes with little or no effect. The idea was dropped for other obvious reasons.

11. Conclusion: The suit is restrictive; with outer garment, very bulky. It requires 15 minutes to don with the assistance of at least one technician. It is uncomfortable over long periods of time. No ventilation is provided. It is remarkably durable. No cases of bladder deterioration or failure have ever been reported. The suit does the job it was designed to do.

F. Gloves.

1. Early gloves had leather palms with green cloth and lacing up the back. Bladders were latex rubber with natural rubber hoses. Common complaints were poor fit, stains on hands from leather, no durability, poor zipper arrangement, bent needle valves, leaks, rubber deterioration, and gloves failing to inflate.

2. Technicians were briefed on proper handling to avoid bending the needle valve. Misalignment would allow the needle orifice to lay against the rubber seat, thus blocking off the pressure supply.

3. Leaks in the glove wasted oxygen and slowed down the rate of inflation. Replacement with neoprene rubber bladders and tubes and improved quality control solved this.

4. The zippers had a tendency to work open by themselves through normal movements by the pilot. Stubborn cases were taped down with small pieces of adhesive. A temporary fix, but one that worked well. Zipper locks have been installed.

5. The latest gloves are all leather with smooth cloth liners and elastic wrist grips. Design has eliminated the lacing and

improved comfort. Favorable reports state the gloves feel like regular leather dress gloves in actual use. A locking device has been incorporated on the hose for a more positive connection to the suit.

6. Conclusion: After many early problems the gloves evolved into a safe, durable item. The latest all-leather glove works well and appears to be the answer.

G. Boots.

1. Practically all types of high-top boots, from the lowly brogan to expensive handmade cowboy boots have been used by the pilots. Mexican leather, dehner, G.I., Air Police, Thermo, Cheppewa, and insulated hunting boots are still used at the present time. Various combinations of socks also exist. Pilot boot selection is permitted.

2. The conclusions drawn are these: The tendency is for the pilot's feet to become colder than the rest of his body. A well-fitting Chippewa (commercial) boot with one or two pair of heavy socks works fine. Too tight a fit or too tight lacing increases heat loss. The foot should be allowed the same movement it would have in a dress shoe.

3. A floor padding (red carpet) has been used to keep the pilot's boot from resting against the bare metal floor. This, and allowing the pilot to work out his own problem, have reduced complaints considerably.

H. Seat Pack.

1. Up to the time of installation of the ejection seat, the seat pack has changed very little. It is a plastic contoured shaped container with an adjustable cloth zippered bag for a bottom. It contains the heart of the oxygen system--a single regulator, the emergency oxygen supply, foam rubber padding, and room for survival gear.

2. Height is critical. Too thick a pack causes the pilot's head to hit the canopy. A smaller pilot can carry more survival gear than a tall one. Packing of survival gear is important. Several cases reported of sleeping bags expanding, fluid leakage, ointment tubes breaking open. These problems have been resolved by using specially packed equipment.

3. In practice, each regulator is adjusted to the particular pilot's need and comfort. Normally, the pilot uses the same seat pack for every flight.

4. One case of regulator malfunction has been reported; four cases of suspected malfunction. There has been no conclusive evidence as to cause in the suspected cases.

5. Several reports state pulsating inflation at low altitude, too low a breathing pressure causing the helmet liner to fall against the face and too high a breathing pressure which allows bursts of oxygen to raise the helmet and cause discomfort in breathing. Sticking press-to-test buttons have given false indications of regulator malfunction.

6. All of the above complaints were remedied by more careful adjustment and handling of equipment. In practice any regulator that was suspected was removed and thoroughly tested in a chamber by a techrep before being put back into service.

7. The quick-disconnect presently used was designed early in the program. Poor electrical connections, popping "O" ring seals, and leakage here were alleviated by improved quality control and a safe locking device.

8. The hoses and connections were, and still are, a source of problems. Internal breakage of electrical wiring, poor connections, and rubber separating from the metal bond caused operational slow-downs. Quality control is quite important. This particular item has been U.R.'d.

9. During 1957 the hose connections to the suit were relocated so that it is now possible, although very difficult, for a pilot to disconnect himself when the occasion warrants. Small lock rings were also devised to insure against hoses becoming disconnected during flight.

10. Locating the "green apple" emergency oxygen release was an early problem. Pilot movement caused the cable to wander, making it difficult to locate the knob in an emergency. It was agreed that laying the cable forward underneath the lap belt was the best position. Recent attempts to tie the cable in place have proven dangerous. With the cable secured in any logical manner the choice of leaving the seat pack is no longer available. Present tests incorporate snaps on outer garment. Still working on this.

11. Pilot comfort has always been a concern. Blocks are used aft of the seat pack to relieve the weight of the chute. Back cushions position the pilot, and two-inch thick contoured foam rubber seat cushion has proved satisfactory. A vibrating cushion was tried but other complications arose. This problem is still being worked on.

12. Due to space limitations, the seat pack used in the ejection seat is of different dimensions, however, components remain virtually the same. Ejection packs can be used on both seats. At present packs are being reworked to smaller size. Also at present a dual oxygen/dual regulator system is being tested in one aircraft. Installation is not complete and no conclusive results are available at this time.

13. Conclusion: The seat pack is heavy. Without ejection seat, it is extremely difficult to leave the aircraft. The components require care and periodic inspection. Hose and connections should be improved. The problem of seat pack interchangeability should be resolved. There is a desire among the pilots and manufacturer to incorporate a dual regulator system. The seat pack, with its single regulator system, continues to be a controversial item. Discomfort has been alleviated, but not fully resolved.

I. Ejection Seat.

1. The seat is relatively new and is not mentioned in any of the reports reviewed. However, it is operational. Preliminary reports indicate that it is less comfortable and slightly narrower, but capable of ejecting the pilot and his gear clear of the aircraft. It is heavier than the cold seat, and is not used on all flights.

J. Radio.

1. There have been many problems with the radio. Cases of static, weak operation, and radio out, are usually traced to poor connections or broken wires in the faceplate-seat pack system. The mike has a tendency to slip and stay too far away from the pilot's lips. Manual adjustment corrects this.

2. In the early stages, so much trouble had been encountered that a by-pass wire was installed. This enabled the pilot to disconnect from the normal seat pack wiring and plug in directly to the radio through a separate line.

3. An additional emergency radio, operated on its own batteries, was tried. It required another wire hookup and had very short range. This radio was removed later in the program.

4. The radio compass problems were resolved early in the program. It has proved a fairly reliable aid to navigation.

5. Conclusion: The wiring hookup for the radio is inadequate. Many flights were completed on by-pass. The normal system as it stands is fairly unreliable and should be improved.

VIII. Medical.

A. The outstanding complaint reported was pilot fatigue. All we can conclude is that this is a healthy reaction.

B. The write-ups, most common first, are as follows: tired, various localized aches, sore butt, temperament (ranging from highly irritated to well pleased), thirst and dryness, hunger, parts of body numb, marks from improper fit or seams, drowsiness, headache, toothache, nausea from food, nausea from fumes, six cases of localized bends, cramps, eyes irritated, too warm, too cold, rash due to perspiration.

C. All pilots were examined by competent P.E. Officers, when available by a flight surgeon, and prompt attention given to all problems no matter how minor. Medical authorities have analyzed all details and have drawn their own conclusions. A lot of this type information was included in the accident reports.

D. Conclusion: The pilot must be prepared mentally and physically for the flight. He must anticipate ills and guard against them. The P.E. Officer plays a large part in assuring the well-being of the pilot. Preparation in advance allows the pilot the maximum of relaxation prior to flight. The pilot is encouraged to do the minimum amount of work, conserving his energies for the flight. All this is easier said than done, and requires a spirit of optimism and cooperation from all concerned.

IX. Comments.

A section of the flight reports was utilized for comments from the P.E. Staff as well as the pilot. They covered a variety of items peculiar to the flight as well as suggestions. Very few formal incident reports were made.

A. Oil in the cockpit. Early model engines (-37) leaked oil through the defrosting and heating system causing much discomfort. The fumes were toxic. Removing the faceplate for short periods (on landing) caused cases of nausea and eye irritation. There was one case reported of oil condensing on the faceplate and leaking down into the exhalation valve. Introduction of the -31 engine practically eliminated this problem. Some detectable fumes were noted by running the defrost wide open, however this was not its normal operating position. No complaints along this line reported.

B. Pressure seals. The most frequent problem concerning the seal occurred with flameouts. On re-light cabin pressurization would build up so quickly that it caused severe pain to the pilot in the

ear drum area. It is alleviated somewhat by leaving the engine in idle after relight allowing the pressure to build up at a slower rate. This is still a problem. Another seal problem occurred when trying to ditch the canopy prior to bail-out. The seal normally had a 5 PSI operating pressure. This caused a bind and the canopy would not leave the ship. A dump valve was devised, operating off the emergency release handle. When the handle was pulled, it dumped the seal pressure, allowing the slipstream to remove the canopy. Early dump valve installations were too critical. A slight jarring or movement of the handle would dump the pressure. Adjustment and safety wire alleviated this.

C. Cockpit Heat.

1. Heat is controlled by a rheostat on the panel. It positions a butterfly valve electrically which in turn meters cooling and hot air to the cockpit. Six cases reported of heat stuck in the hot position. This is very dangerous. It usually pops some circuit breakers, and is capable of attaining 280° F. in the cockpit. De-pressurizing cabin was an aid. It shut off all engine air to cockpit and diluted heat with ram air. Running system on manual, or pulling cockpit heat circuit breaker helped, according to the malfunction.

2. Another cause for no cockpit heat was pilot's inadvertently taking off with pressurization switch in ram position. No engine air is available in RAM. Normally, switching from ram to pressure at low altitudes was no problem, but if this was done above the freezing level, any water that condensed and froze could cause a malfunction.

D. Ground Control. Several complaints in the early stages of too much radio chatter. Some pilots express the opinion that too much instruction over the air was distracting, particularly in the landing pattern. This was a problem dealing in personalities. As techniques developed, these problems were no longer reported.

E. Pre-breathing.

1. At the start of the program it was decided that 2 hours prior to take-off, the pilot would go "on the hose" for pre-breathing. Breathing pure oxygen for this length of time eliminates as much nitrogen as possible from the blood stream. In the event of a flameout, the possibility of getting the bends was slight. This worked well in practice with only ~~four~~ six cases of bends reported. Later on, personnel began to hedge, getting satisfactory performance with as little as 45 minutes hose time. However, to assure maximum protection for all pilots, 2 hours pre-breathing has become SOP.

Approved For Release 2003/12/10 : CIA-RDP63-00313A000600020044-6

2. A number of cases reported pilots making two, and as many as four short flights by transferring to walk-around bottles during ground time. This worked out well, however it appeared to fatigue the pilots in a shorter period of time.

F. Contour Cushion. During the training phase, a large 2-inch foam rubber seat cushion was used. This was the best item available at the time. However, cushions were hard to obtain, and some outfits flew for over a year on thinner or makeshift arrangements. It is mentioned here to illustrate the problem of supply. Supply was of major importance. Many items that were taken for granted in one location were not available in another. Pilots continued to complain. Pre-planning, coordination, and expediting help alleviate the situation.

G. Sextant. Much controversy over the sextant. However, it was simple to operate and proved reliable. It has been utilized as an aid to navigation with pre-computed data, rather than a position fixing device. Pilot proficiency has improved throughout the program. At present it is considered a very reliable navigational aid.

H. Water Survival Gear. A thin, light weight dinghy can be stored in the seat pack. Three types of life vests are available. In tests run in 1957, several failings were obvious. Due to restricted movement, the dinghy was very difficult to get at and inflate. The Air Force Mae West proved bulky and restrictive whether worn inside or outside of the parachute harness. The Navy type Mae West was less bulky but had the same faults. A compact under-arm life preserver continually snagged in the parachute harness. It also restricted arm movement with the pilot seated in the cockpit. Some buoyancy was afforded by the suit itself. Some seat packs floated, others didn't. It was extremely difficult to remove the parachute harness. A supreme effort was required to board the dinghy.

It was concluded that all faculties were required for water survival, and that in choppy Arctic seas most pilots would drown. Water survival is mentioned here, though the reports covering it are no longer available. We still have the problem.

I. Seat failing to lock. In rough air pilots reported the seat bottoming or throwing them up against the canopy due to a faulty locking mechanism. Larger lock springs were installed, and more care given to adjustment. Recent incidents are rare. The ejection seat is not adjustable.

J. Oxygen.

1. Oxygen Selector Valve Broken. There were four cases reported of selector valves being difficult to operate, sticking and

then breaking or being broken. These valves cannot be lubricated. They were replaced with easier operating valves. The incidents have not been serious, as the valve has always malfunctioned to the open position. No problems recently.

2. Quick Disconnects. The early disconnects were poorly made. They would come loose, short out, leak, and pop "O" ring seals. This caused three cases of pilots discovering zero pounds oxygen pressure at altitude necessitating immediate descent on emergency supply. Two leakage problems reported with new quick disconnect due to poor seating. Quality control seems to be the answer.

3. Two cases reported of pilots running out of oxygen prematurely due to leakage in the ship's system. The pressure line arrangement is such that the ship's gauge would give a normal reading even though one bottle was empty. It was recommended that the ship's oxygen supply be "topped off" just prior to the flight to assure maximum volume.

K. Aborts. Occasional reports of abort. It is estimated that the maximum number is 15. Weather, no cockpit heat, equipment out, hydraulic leaks, pressurization out, and engine malfunctions accounted for those reported.

X. CONCLUSION.

Hundreds of checks are made prior to flight. Weather is a factor at times. We have had excellent results. The total aborts for missions flown is very low.

Reviewing these reports has brought to mind the countless amount of time and effort put forth by all concerned. The ground crew, the fire department, handling personnel, and administrative personnel seldom gain recognition by name, only by job. We feel they have played an equally important part in accumulating this information, along with all those who have sweated out flight preparation, take-off, and at times, not-so-safe return of the pilot.